

The identity of *Lonchodes geniculosus* (Westwood, 1848) – a mistaken Lonchodinae from Malaysia and the description of the female (Phasmatoidea: Phasmatidae: Lonchodinae)

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Abstract

Lonchodes geniculosus (Westwood, 1848) was previously only known from the male holotype and has since been incorrectly referred to as a synonym of *Lonchodes geniculatus* Gray, 1835. Comparison of both species proved *Lonchodes geniculosus* (Westwood) to be a valid taxon. A redescription of the male, a description of the newly discovered female and illustrations of both sexes are provided. The systematic position and differentiation of *Lonchodes geniculosus* (Westwood) from other species of *Lonchodes* Gray, 1835 are briefly discussed. A synonymic list for *Lonchodes geniculatus* Gray, 1835 as well as measurements and illustrations of both sexes are provided.

Key words

Phasmida, Phasmatoidea, Lonchodinae, *Lonchodes geniculosus*, Malaysia, Myanmar, descriptions, erroneous synonym.

Introduction

There is still much confusion within the taxonomy of the large subfamily Lonchodinae. The males of *Lonchodes* Gray, 1835 and closely related genera prove especially difficult to identify or distinguish. Consequently there are still numerous undescribed synonyms or species which have been erroneously synonymized by previous authors and prove to represent valid taxa. In several cases breeding of the species has been the key for matching the sexes, and as a larger variety of species from this subfamily have been reared in Europe the systematics of this group have improved.

Westwood (1848 : 80) originally described and illustrated (pl. 39 : 4) *Phasma (Bacteria) geniculosum* from a single male collected on Pulau Pinang. Recognizing the species belonged to the genus *Lonchodes* Gray, 1835 (Type-species: *Lonchodes brevipes* Gray, 1835 : 19), Westwood (1859 : 37) synonymized *Lonchodes geniculosus* with *Lonchodes geniculatus* Gray, 1835 after noting the likely synonymy in his original description. Since then, *Lonchodes geniculosus* (Westwood, 1848) has been erroneously referred to as a synonym of *Lonchodes geniculatus* Gray, 1835 by all later authors (Brunner von Wattenwyl, 1907, Brock 1995 & 1999). Kirby (1904a: 372) established his new genus *Staelonchodes* on *L. geniculatus* Gray, 1835, but he did not describe the genus and could not have examined the type specimen in MVMA. By transferring *L. geniculatus* back into *Lonchodes* Gray, 1835 Brock (1995: 86) synonymised the two genera; this still requires confirmation since close examination and comparison shows several characters of the insects and eggs which may confirm the validity of Kirby's *Staelonchodes*. If Brock's identification of *L. geniculatus* is correct, *Staelonchodes* Kirby may have to be reinstated with several of the species currently included in *Lonchodes* being transferred. In his dreadful revision of the genus *Lonchodes* Gray, Günther (1932) does not list either *geniculatus* or *geniculosus*.

Comparison of males and females of an unidentified *Lonchodes* in the author's collection with the holotype of *Lonchodes geniculosus* (Westwood) in OXUM proved these to be the same species. Further research showed the female to be as yet undescribed. Subsequent comparison of these with specimens of *Lonchodes geniculatus* Gray, obtained from local dealers in Peninsular Malaysia and Thailand, and collected by Francis Seow-Choen in Singapore, clearly showed them to represent two distinct species.

Consequently *Lonchodes geniculosus* (Westwood, 1848) is a valid species, which was so far only known from the male sex. Apart from its synonymy and identity being discussed, this paper provides a redescription of the male, a first description of the female as well as illustrations of both sexes. For an easier distinction of the two taxa notes as well as measurements and illustrations for *Lonchodes geniculatus* Gray are also provided.

Searching in other museum and private collections only revealed one further male in NHMW which was provisionally identified as "*Lonchodes* sp." and six specimens in the collection of O. Conle (Fischen, Germany) which were obtained from the same source as the specimens in the author's collection.

Abbreviations used:

MVMA: Museum of Victoria, Abbotsford, Victoria, Australia.

NHMW: Naturhistorisches Museum Vienna, Austria.

OXUM: Oxford University Museum, Oxford, England.

FH: Private collection of Frank H. Hennemann, Freinsheim, Germany.

OC: Private collection of Oskar V. Conle, Fischen, Germany.

Lonchodes geniculosus (Westwood, 1848)

Phasma (*Bacteria*) *geniculosum* Westwood, 1848 : 80, pl. 39 : 4. Holotype, ♂: Malacca, Prince of Wales Isl., S. Cantor (OXUM, No. 562).

[*Lonchodes geniculatus*, Westwood, 1859 : 37, synonymized with *Lonchodes geniculatus* Gray, 1835 – erroneous synonym]

[not *Lonchodes geniculatus*, Brunner von Wattenwyl, 1907 : 258, erroneous reference to *L. geniculosus* (Westwood) as a synonym of *L. geniculatus* Gray]

[not *Lonchodes geniculatus*, Brock, 1995 : 86, erroneous reference to *L. geniculosus* (Westwood) as a synonym of *L. geniculatus* Gray]

[not *Lonchodes geniculatus*, Brock, 1999 : 170, erroneous reference to *L. geniculosus* (Westwood) as a synonym of *L. geniculatus* Gray]

Material

3♂♂, 3♀♀, Myanmar, Tenasserim, via Lehmann, vi.1995 (FH 0267-1 to 6); 1♂, Penang, Coll. Br. v. W. (NHMW, No. 545); 3♂♂, 2♀♀, 1♀ nymph, Myanmar, Tenasserim, via Lehmann, vi.1995 (OC).

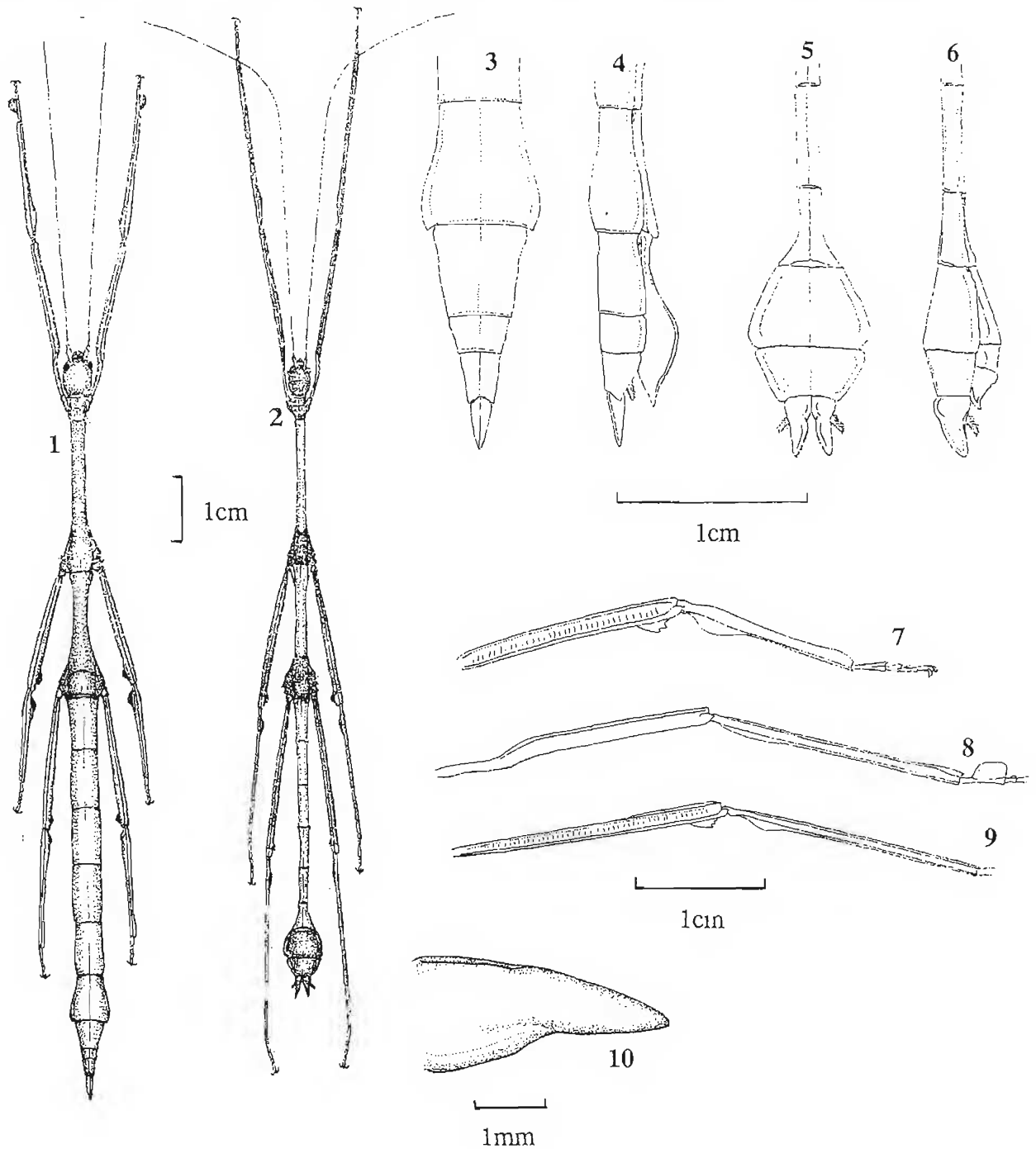
Diagnosis

Closely related to the type species *Lonchodes brevipes* Gray, 1835 from Peninsular Malaysia and Sumatra and *Lonchodes margaritatus* (Brunner von Wattenwyl, 1907) from Thailand and Vietnam but easily distinguished from both species by the lancett-like supraanal plate of females, greenish brown body colouration of both sexes and broadened terminal abdominal segments of males. Additionally it differs from the first by: more slender body; greenish instead of uniformly brown body colouration and more elongate and less prominently lobed legs of both sexes. From the second it additionally differs by: the more elongate body and legs of both sexes; strongly medially constricted metathorax and laterally dilated and swollen abdominal tergite VII of females.

The lancett-like supraanal plate of females shows relation to the bornean *Lonchodes everetti* (Kirby, 1896). The broadened terminal abdominal tergites of the male resembles *Lonchodes skapanus* Brock, 1999 from Peninsular Malaysia.

Description of female (Figs. 1, 3, 4, 7, 8)

Medium-sized (body length 116.0-118.5mm), relatively slender species (average body width 4.0mm), typical for the genus and with an elongate, lancett-shaped supraanal plate. Head and thorax evenly granulose; abdominal tergites evenly granulose at anterior, becoming sparingly and much more indistinctly granulose towards the posterior; sternites very unevenly



Figures 1-10 *Lonchodes geniculosus* (Westwood, 1848).

1. Female. dorsal view.
2. Male, dorsal view.
3. Apex of female's abdomen, dorsal view.
4. Apex of female's abdomen, lateral view.
5. Apex of male's abdomen, dorsal view.
6. Apex of male's abdomen, lateral view.
7. Left mid leg of female.
8. Right front leg of female.
9. Left mid leg of male.
10. Lateral view of anal segment of male.

granulose. All carinae of femora and tibiae, very minutely granulose. Head and body uniformly mid green dorsally; lateral and ventral surfaces orange brown. Legs green, with apical end of femora brownish. Antennae black, but becoming brownish towards bases. Tergites II-VII occasionally with a bold white longitudinal lateral line.

HEAD: About 1.5x longer than wide, globose, vertex rounded and convex with a short and indistinct W-shaped impression between bases of antennae. Eyes very small, oval, convex dark reddish brown and unevenly projecting from head capsule. Antennae reaching posterior margin of median segment, antennomeres increasing in length towards middle and strongly shortened towards apices. Scapus almost 2.5x longer than wide, dorsoventrally compressed, slightly laterally dilated, oval seen from dorsal. Pedicellus about $\frac{1}{4}$ the length of scapus, cylindrical.

THORAX: Pronotum shorter than the head, 1.3x longer than wide, almost rectangular, posterior margin slightly rounded. Anterior margin slightly raised and median transverse depression, distinct, lighter green and reaching lateral margins of segment. Mesonotum long, parallel-sided, slightly widening and flattened at posterior margin. Mesopleurae widening and projecting over mesonotum just before the leg joint, increasing the body width to almost 1.5x the width of mesonotum. Mesosternum simple. Metanotum about $\frac{2}{3}$ the length of mesonotum, widened at anterior and posterior margin and strongly constricted at the middle. Metasternum simple.

ABDOMEN: Median segment about 1.3x broader than long, distinctly shorter than metanotum, posterior margin broader than anterior margin. Segments II-VI almost of equal length and width, parallel-sided, about 2x longer than wide. II slightly widening towards anterior margin. Tergites with a fine median line, sternites smooth with slightly raised lateral margins. Posterior margin of sternite VII slightly swollen. Tergit VII slightly shorter than previous, distinctly swollen and widening towards posterior margin; lateral margins forming a very shallow, rounded lobe. VIII shorter than VII, anterior margin distinctly broader than posterior margin, about 1.5x longer than wide and with a very fine median carina. IX less than half the length of previous, broader than long, convex. Anal segment, with a fine median carina, tapering towards posterior margin which has a deep concave incision; angles pointed and triangular. Supraanal plate more or less equal in length to anal segment, tapered towards apice and strongly keeled. Cerci very small, pale brown, cylindrical with pointed apices and minutely setose. Operculum reaching posterior margin of anal segment, keeled, slightly convex in posterior half.

LEGS: Mid legs reaching over posterior margin of tergite III, hind legs projecting over tergite VI; mesofemora reaching posterior of median segment. Femora quadrate in cross-section. Profemora slightly laterally compressed, posterodorsal carina lower and more indistinct, than anterodorsal carina; basally compressed and curved. Ventromedian carina of protibiae raised into a flat ledge, which is lightly rounded at base. Dorsal carina raised and diverging apically, forming an impressed, triangular area. Probasitarsus as long as remaining segments combined, except claw, dorsal carina raised into a prominent almost semicircular lobe. Meso and metafemora slightly swollen, becoming broader towards apices and indistinctly downcurving. Ventral carinae apically raised into two slightly converging, toothed lobes. Medioventral carina very indistinct and flat. Ventral carinae of meso and metatibiae very unevenly widened just behind base and at apice. Medioventral carina strongly raised and forming a rounded lobe basally (more distinct on mesotibiae). Meso- and metabasitarsus slightly longer than following three segments combined.

Measurements of specimens in the author's collection are given in table 1.

Description of male (Figs. 2, 5, 6, 9, 10)

Medium-sized (body length 99.0-100.5mm), very slender and colourful species, typical for the genus and with distinctly broadened abdominal tergites VII-IX. Head, thorax and legs densely; abdominal tergites granulate at anterior, becoming very sparingly and indistinct towards the posterior; sternites very indistinctly granulate. Head, pronotum and posterior section of mesothorax and metathorax as well as median segment dark blueish green. Remaining parts of body pale olive tending to get darker on abdomen, segments VIII-X dark brown. Tergite II with a small white anterolateral spot. Legs glossy greyish green with black carinae; knees bright red. Antennae entirely reddish black.

HEAD: Generally as in female but eyes relatively larger and more prominently projecting from head capsule. Antennae as in female but reaching to posterior margin of abdominal tergite IV.

THORAX: Pronotum shorter and narrower than head, slightly medially constricted but generally as in female. Mesothorax cylindrical, very elongate and slightly widening at the posterior. Mesopleurae posteriorly widened, projecting over mesonotum and widening the body width to about 1.5x the width of mesonotum. Metathorax about $\frac{3}{4}$ the length of mesothorax, widened at anterior and posterior margin.

ABDOMEN: Median segment distinctly shorter than metanotum, rectangular about 1.5x longer than wide. Segments II-VI of almost equal length, slightly medially constricted, 3.5x longer than wide. Tergites with a faint median carina. VII $\frac{3}{4}$ the length of VI and strongly widening in posterior half. VIII almost 3x broader than II-VI, strongly swollen, posterior margin broader than anterior margin. IX narrowing towards posterior margin, anterior margin as broad as VIII. Anal segment laterally compressed, divided longitudinally, formed two slightly downcurving, roughly triangular lobes; dorsal carina with a median impression. Interior surfaces armed with numerous minute black teeth. Cerci small, cylindrical, incurving. Subgenital plate very slightly projecting over posterior margin of tergite IX, slightly convex and posteriorly carinated and posteromedially notched.

LEGS: All very long and slender; mid legs reaching posterior margin of tergite V; hind legs projecting over apex of abdomen; mesofemora reaching to middle of tergite II. Profemora basally compressed and curved, posterodorsal carina reduced and lower than anterodorsal carina. Protibiae simple. Probasitarsus almost 2x longer than remaining segments combined. Meso- and metafemora slightly swollen and quadrate in cross-section. Ventral carinae apically with a triangular tooth, followed by 1-2 smaller teeth on common base. Medioventral carina of meso- and metatibia slightly rounded near base. Meso- and metabasitarsus slightly longer than combined length of remaining segments.

Measurements of specimens in the authors collection are given in table 1.

Comments

The locality "Myanmar, Tenasserim" of the specimens in the collections of FH and OC is questionable as this is a highland area in contrast to the type locality of *Lonchodes geniculosus* (Westwood), Pulau Penang, which is a small and flat island few kilometres of the northwest coast of Peninsular Malaysia close to the Thailand border. Much of the material from this source and labelled "Myanmar" seems to be from other regions respectively. As an example, two males of *Lonchodes rubrifemur* (Brunner von Wattenwyl, 1907) with the data "Myanmar, Tenasserim" could be obtained, although the type locality given by Brunner von Wattenwyl (1907) is Borneo.

Comparison of the Myanmar specimens with the holotype of *L. geniculosus* (Westwood) in OXUM however leaves no doubt in these being conspecific. Males show a very typical colouration and shape of anal segment which readily distinguishes it from other closely related

taxa. The females are readily distinguished from all other representatives of the genus in this region, by the elongate supraanal plate and typical shape of thorax, terminal abdominal segments and lobes of the legs. The shape of the supraanal plate shows relation to the bornean *Lonchodes everetti* (Kirby, 1896).

None of the examined females had an egg in its ovipositor and, since none was in the egg-laying stage when collected, the eggs are still unknown.

Measurements (mm)	<i>L. geniculosus</i>		<i>L. geniculatus</i>	
	♂♂	♀♀	♂♂	♀♀
Body	99.0-100.5	116.0-122.5	84.5-105.0	96.5-126.0
Head	3.8	5.7-6.5	3.6-4.1	5.0-5.8
Pronotum	3.0	3.9-4.3	3.0-3.8	4.0-5.0
Mesonotum	24.0-24.5	22.5-24.6	23.0-27.0	22.5-29.5
Metanotum	16.0-16.8	15.8-16.5	12.3-15.2	12.7-16.1
Median segment	2.7	3.6-3.9	3.4-4.2	3.6-4.7
Profemora	27.0-28.2	22.5-26.6	21.8-26.0	19.0-25.0
Mesofemora	20.9-23.0	18.4-20.1	15.8-18.2	14.2-19.0
Metafemora	24.0-26.8	21.0-23.2	18.0-22.5	16.1-19.8
Protibiae	27.0-30.5	21.0-24.5	23.1-28.0	19.0-25.0
Mesotibiae	19.6-21.8	14.8-17.0	12.6-14.3	10.0-13.8
Metatibiae	26.1-29.2	17.4-21.6	19.1-22.2	16.0-19.7
Antennae	75.0	50.0-51.8	55.0-64.0	36.0-46.0

Table 1: Measurements of *Lonchodes geniculosus* (Westwood, 1848) and *Lonchodes geniculatus* Gray, 1835 (only from specimens in collection of FH).

Lonchodes geniculatus Gray, 1835

Lonchodes geniculatus Gray, 1835: 19. Holotype, ♂, India Orientali (MVMA - not traced, see Bragg, 2001: 436) Westwood, 1859: 37; Brunner von Wattenwyl, 1907: 258; Seow-Choen, Brock & Seow-En, 1994: 12; Brock, 1995: 86; Seow-Choen, 1997: 63, figs. 37 (♂), 38-39 (♀), 40 (egg); Brock, 1999: 35 & 170, figs. 16 (♂), 17a-f (♀), 17g (egg); Seow-Choen, 2000: 10, pl. 10 (♂ & ♀).

Staelonchodes geniculatus, Kirby, 1904a: 372; Kirby, 1904b: 317.

Prisomera thoracicum Brunner von Wattenwyl, 1907: 289. Holotype, ♀: Malakka, Perak, Jachau (NHMW, No. 561) (synonymized by Seow-Choen, Brock & Seow-En, 1994: 12) [note: Günther, 1932: 376 incorrectly synonymized *P. thoracicum* with *Lonchodes hosei* Kirby, 1896]; Brock, 1998: 62.

[not *Phasma (Bacteria) geniculosum* Westwood, 1848, erroneous synonym by Westwood, 1859: 37]

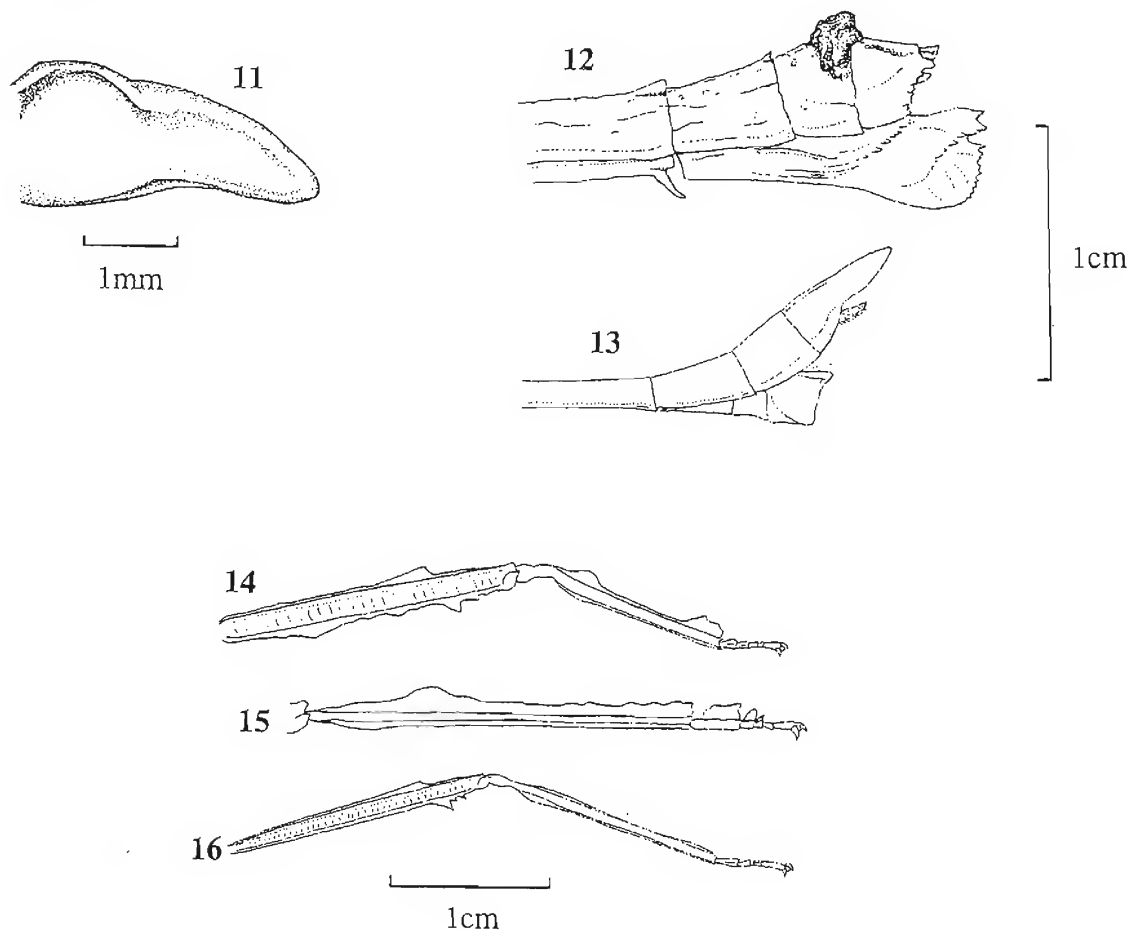
[not *Lonchodes geniculatus* Stål, 1875: 64, from "Insulae Philippinae, coll. Brunner" - presumably relating to *Lonchodes mindanaense* (Brunner, 1907) - Misidentification.]

Material

1 ♀, West Malaysia, Pulau Penang, leg. M.K.P. Yeh v.1993 (FH 0147-1); 1 ♀, 28 eggs, ex Zucht: F. Seow-Choen, vii.1994 (FH 0147-2, E & ED); 2 ♀♀, Singapore, Island Club Road, leg. F. Seow-Choen, vii.1995 (FH 0147-3 & 4); 2 ♂♂: Singapore, Island Club Road, leg. F. Seow-Choen, iv-v.1993 (FH 0147-5 & 6); 2 ♂♂, 4 ♀♀, S-Thailand, Phuket, leg. Stobbe iii.1998 (FH 0147-7 to 12).

Comments

The species is widely distributed within Peninsular Malaysia, but also frequently found in Singapore and in the Phuket area in Southern Thailand. Stål (1875: 64) recorded it from the Philippines in error. Brock (1999: 35) provided brief descriptions of both sexes and the eggs and gave a listing of native foodplants. The females of this species show a wide range of intraspecific variation, which is partly illustrated and described by Brock (1999, figs. 17a-f) and Seow-Choen (2000, pl. 10).



Figures 11-16 *Lonchodes geniculatus* Gray, 1835

- 11. Lateral view of anal segment of male.
- 12. Apex of female's abdomen, lateral view
- 13. Apex of male's abdomen, lateral view
- 14. Left mid leg of female (FH 0147-1).
- 15. Right fore tibia of female.
- 16. Left mid leg of male.

Specimens in the author's collection from Southern Thailand are remarkably shorter than specimens from Peninsular Malaysia and Singapore, but do not differ in any other features except smaller size. Size ranges: Thailand: males 84.5-86.0mm, females 96.5-108.0mm; Peninsular Malaysia & Singapore: males 103.0-105.0mm, females 114.5-126.0mm.

Rather than *L. geniculosus* (Westwood, 1848), it is closely related to the two Bornean species *Lonchodes amaurops* Westwood, 1859 and *Lonchodes harmani* Bragg & Chan, 1993, which are remarkably similar in body sculpturing and shape of genitalia and mid legs.

Measurements of males and females in the author's collection are given in table 1. The male and female are illustrated in figures 9-14.

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